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ASD 902 (2006) (English): Standards For Surface-Level Heliport

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# AIRPORT STANDARDS DIRECTIVE 902
# [ASD 902]

# STANDARDS FOR
# SURFACE-LEVEL HELIPORT

**AIRPORTS STANDARDS DIVISION**
**DEPARTMENT OF CIVIL AVIATION MALAYSIA**

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# INTRODUCTION

1. This Airport Standards Directive contains specifications that prescribe the physical characteristics, obstacle limitation surfaces, facilities and technical services that shall be provided at surface-level heliports.

2. This Directive has been written in general terms. Specific advice could be obtained from the Authority at:

Department of Civil Aviation
Airport Standards Division
Level 1 Block Podium B 4G4 Precinct 4
Federal Government Administration Offices
62570 Putrajaya.
Phone: 03-88714000
Fax : 03-88714335

# APPLICABILITY

3. The specification in this Directive shall apply to the approval, licensing or certification of surface-level heliports.

4. Surface-level heliports are heliports located on the ground.

# AUTHORITY

5. The Authority referred to in this Directive is the Director General of Civil Aviation.

# HELIPORT DOCUMENTATION

## 1. AERODROME MANUAL

6.1 The aerodrome manual is a fundamental requirement for the approval, licensing or certification of surface-level heliports.

6.2 The aerodrome manual shall contain all pertinent information concerning the heliport site, facilities, services, equipment, operating procedures, organization and management.

6.3 The information presented in the aerodrome manual shall demonstrate that the heliport conforms to specifications of Airport Standards Directive 902, other relevant Directives, the Civil Aviation Regulations 1996 and the Civil Aviation Act 1969.

6.4 The Aerodrome Manual shall take the form and contains information as detailed in Appendix A.

## 2. GEOGRAPHICAL COORDINATES

7.1 Geographical coordinates indicating latitude and longitude shall be determined and reported in terms of the World Geodetic System – 1984 [WGS-84] geodetic reference datum.

7.2 The order of accuracy of the field work shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated herein –

a. significant obstacles on and in the vicinity of the heliport and positions of radio navigation aids located on the heliport: three meters;

b. geometric centre of the TLOF, threshold[s] of the FATO: one meter;

c. centerline points of the helicopter ground taxiways, air taxiways and air transit routes and helicopter stands: one-half meter; and

d. heliport reference point: thirty meters.

## 3. HELIPORT REFERENCE POINT

8.1 A heliport reference point shall be established for a heliport not co-located with an airport.

8.2 The heliport reference point shall be located near the initial or planned geometric centre of the heliport and shall normally remain where first established.

8.3 The position of the heliport reference point shall be measured and reported in degrees, minutes and seconds.

## 4. HELIPORT ELEVATIONS

9.1 The heliport elevation shall be measured and reported to the nearest meter.

## 5. HELIPORT DIMENSIONS

10.1 The following data shall be measured or described, as appropriate, for each facility provided on a heliport –

a. heliport type;

b. TLOF – dimension, slope, surface type, bearing strength in tonnes;

c. FATO – type of FATO, true bearing, designation number [where appropriate], length, width, slope, surface type;

d. safety area – length, width and surface type;

e. helicopter ground taxiway, air taxiway and air transit route – designation, width, surface type;

f. apron – surface type, helicopter stands;

g. clearway – length, ground profile; and

h. visual aids for approach procedures, markings and lighting of FATO, TLOF, taxiways and aprons.

10.2 The geographical coordinates of the geometric centre of the TLOF and/or of each of the threshold of the FATO [where appropriate] shall be measured and reported in degree, minutes, seconds and hundredths of seconds.

10.3 The geographical coordinates of the appropriate centerline points of the helicopter ground taxiways, air taxiways and air transit routes shall be measured and reported in degree, minutes, seconds and hundredths of seconds.

10.4 The geographical coordinates of each helicopter stands shall be measured and reported in degree, minutes, seconds and hundredths of seconds.

10.5 The geographical coordinates of significant obstacles on and in the vicinity of the heliport and positions of radio navigation aids located on the heliport shall be measured and reported in degree, minutes, seconds and tenths of seconds. In addition, the top elevation rounded up to the nearest meter, marking and lighting [if any].

## 6. **DECLARED DISTANCES**

11.1 The following distances shall be declared, where relevant, for a heliport –

a. take-off distance available [TODA];

b. rejected take-off distance available [RTODAH]; and

c. landing distance available [LDA].

11.2 Take-off distance available shall be the measured distance of the length of the FATO plus the measured length of any clearway provided.

11.3 Rejected take-off distance available shall be the measured distance of the length of the FATO which includes the distance which is declared available and suitable for performance class 1 helicopter to safely complete a rejected take-off. The RTODAH must have a surface which is resistant to the effects of rotor downwash, be free of irregularities which could affect the safe landing of helicopters and have a bearing strength sufficient to accommodate the rejected take-off by performance class 1 helicopter.

11.4 Landing distance available shall be the measured distance of the length of the FATO plus the length of any additional area declared available and suitable for helicopters to complete the landing manoeuvre from height of 30 m. The surface of the additional area must have the same characteristics as the FATO.

## 7. **RESCUE AND FIRE FIGHTING**

12.1 The level of protection described as Category of rescue and fire fighting services shall be reported.

# PHYSICAL CHARACTERISTICS

## 8. FINAL APPROACH AND TAKE-OFF AREAS [FATO]

13.1 A FATO is an area which a helicopter completes the approach manoeuvre to a hover for landing or commences movement into forward flight in the take-off manoeuvre. All final approaches shall terminate at the FATO and all take-offs to climb shall start at the FATO. A touchdown or lift-off may or may not be made at the FATO.

13.2 A surface-level heliport shall be provided with at least one FATO.

13.3 The FATO dimensions shall be -

i. for a heliport intended to be used by performance class 1 helicopters – as prescribed in the helicopter flight manual except that, in the absence of width specification – with width that shall be not less than 1.5 times the overall length/width, whichever is greater, of the longest/widest helicopter that the heliport is intended to serve.

ii. for a heliport intended to be used by performance class 2 and 3 helicopters – as prescribed in the helicopter flight manual - of sufficient size to contain an area within which can be drawn a circle whose dimension is not less than 1.5 times the overall length/width, whichever is greater, of the longest/widest helicopter that the heliport is intended to serve.

- however, local conditions such as elevation and temperature may need to be considered when determining the size of FATO to ensure economical viability of the heliport.

13.4 The over-all slope in any direction on the FATO shall not exceed 3 per cent. No portion of the FATO shall have a local slope exceeding –

i. 5 per cent where the heliport is intended to be used by performance class 1 helicopters; and

ii. 7 per cent where the heliport is intended to be used by performance class 2 and class 3 helicopters.

13.5 The surface of the FATO –

i. shall be resistant to the effects of rotor downwash;

ii. shall be free of irregularities that would adversely affect the take-off or landing of helicopters; and

iii. should provide ground effect.

13.6 The bearing strength of a FATO should cover for emergency landing. A FATO designed to accept performance class 1 helicopters shall have bearing strength capable of withstanding a rejected take-off, which may equate to an emergency landing.

9. **TOUCHDOWN AND LIFT-OFF AREA [TLOF]**

14.1 A TLOF is an area provided where the undercarriage of a helicopter will actually touch down on the surface of a heliport or leave the surface to achieve a hover. A TLOF may or may not be located within the FATO.

14.2 At least one TLOF shall be provided at a heliport.

14.3 The TLOF shall –

i. where TLOF and FATO are coincidental, be of similar shape and dimensions as the FATO;

ii. where TLOF and FATO are not coincidental, be of any shape but of sufficient size within which can be drawn a circle of a diameter 1.5 times the length or width of the undercarriage, whichever is greater, of the largest helicopter the heliport is intended to serve.

14.4 Slope on a TLOF shall be sufficient to prevent accumulation of water on the surface of the area, but shall not exceed 2 per cent in any direction.

14.5 The TLOF shall be free from any obstacle, loose stones or any other loose articles that could be stirred up by rotor downwash. TLOF used in all weather conditions shall be paved.

14.6 A TLOF shall be capable of accommodate the traffic of helicopters that the area is intended to serve. The bearing strength of the TLOF shall be sufficient to withstand the dynamic loading imposed by the heaviest and/or largest helicopter.

10. **SAFETY AREA**

15.1 A safety area is intended to –

i. reduce the risk of damage to a helicopter caused to move off the FATO by effect of turbulence or cross-wind, mislanding or mishandling; and

ii. protect helicopters flying over the area during landing, missed approach or take-off by providing an area which is cleared of all obstacles except small, frangible objects which, because of their function, must be located on the area.

15.2 A FATO shall be surrounded by a safety area.

15.3 A safety area surrounding a FATO intended to be used in visual meteorological condition shall be extended outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 times the over-all length/width, whichever is greater, of the longest/widest helicopter that the heliport is intended to serve.

15.4 A safety area surrounding a FATO intended to be used in instrument meteorological condition shall be extended -

i. laterally to a distance of at least 45 m on each side of the centre line; and

ii. longitudinally to a distance of at least 60 m beyond the ends of the FATO.

15.5 No objects shall be permitted on a safety area, except for frangible objects, which, because of their function, must be located on the area. No mobile object shall be permitted on a safety area during helicopter operations.

15.6 Objects whose functions require them to be located on the safety area shall not exceed a height of 25 cm when located along the edge of the FATO nor penetrate a plane originating at a height of 25 cm above the edge of the FATO and sloping upwards and outwards from the edge of the FATO at a gradient of 5 per cent.

15.7 The surface of the safety area shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

15.8 The surface of the safety area shall be treated to prevent flying debris caused by rotor downwash.

15.9 The surface of the safety area abutting the FATO shall be continuous with the FATO and be capable of supporting, without structural damage, the helicopter that the heliport is intended to serve.

## 11. **HELICOPTER CLEARWAY**

16.1 A helicopter clearway shall be provided for heliports used by helicopters in instrument meteorological condition.

16.2 A helicopter clearway shall commence at the upwind end of the FATO, including the rejected take-off area, and continue until the first upstanding obstacle, excluding lightweight frangible objects. The presence an obstacle unduly restricts the distance for helicopter clearway shall be removed.

16.3 The width of a helicopter clearway shall not be less than that of the associated safety area.

16.4 The ground in a helicopter clearway should not project above a plane having an upward slope of 3 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

## 12. **HELICOPTER GROUND TAXIWAYS**

17.1 A helicopter ground taxiway is intended to permit the surface movement of a wheeled helicopter under its own power.

17.2 The width of a helicopter ground taxiway shall not be less than –

| Helicopter main gear span | Helicopter ground taxiway width [meters] |
|---|---|
| Up to but not including 4.5 m | 7.5 |
| 4.5 m up to but not including 6.0 m | 10.5 |
| 6.0 m up to but not including 10.0 m | 15 |
| 10.0 m and over | 20 |

17.3 The separation distance between a helicopter ground taxiway and another helicopter ground taxiway, an air taxiway, an object or helicopter stand shall not be less than –

| | Helicopter ground taxiway | Air taxiway | Object | Helicopter stand |
|---|---|---|---|---|
| Helicopter ground taxiway | 2 [between edges] | 4 [between centre lines] | 1 [edge to object] | 2 [between edges] |
| Air taxiway | 4 [between centre lines] | 4 [between centre lines] | 1.5 [centre line to object] | 4 [centre line to edge] |

[expressed in multiples of the greatest over-all width of helicopter with rotor turning]

17.4 The longitudinal slope of a helicopter ground taxiway shall not exceed 3 per cent.

17.5 A helicopter ground taxiway shall be capable of withstanding the traffic of such helicopters that the helicopter ground taxiway is intended to serve.

17.6 A helicopter ground taxiway should be provided with shoulders that extend symmetrically on each side of the helicopter ground taxiway for at least half the greatest over-all width of the widest helicopter that the helicopter ground taxiway is intended to serve.

17.7 The helicopter ground taxiway and its shoulders shall provide rapid drainage but the transverse slope should not exceed 2 per cent.

17.8 The surface of a helicopter ground taxiway and its shoulder should be resistant to the effects of rotor downwash.

## 13. HELICOPTER AIR TAXIWAYS

18.1 A helicopter air taxiway is intended to permit the movement helicopter above the surface at a height normally associated with ground effect and at a ground speed less than 20 knots.

18.2 The choice between providing a helicopter ground taxiway or an air taxiway, where one or the other is required, depends on –

a. the nature of the surface of the ground;

b. the width of an air taxiway that would be considerably greater than the width of a ground taxiway;

c. the effects of turbulence from any adjacent structures on the control of the helicopter;

d. any possible conflict between aeroplanes and helicopters; and

e. the type of helicopter undercarriage i.e. wheels or skids.

18.3 If it is decided to provide both facilities, an air taxiway should not be located immediately above a helicopter ground taxiway, if the two areas are to be used concurrently, considering the effect of rotor downwash.

18.4 The width of an air taxiway shall be at least two times the greatest overall width of the helicopters that the air taxiway is intended to serve.

18.5 The separation distance between a helicopter ground taxiway and another helicopter ground taxiway, an air taxiway, an object or helicopter stand shall not be less than –

| | Helicopter ground taxiway | Air taxiway | Object | Helicopter stand |
|---|---|---|---|---|
| Helicopter ground taxiway | 2 [between edges] | 4 [between centre lines] | 1 [edge to object] | 2 [between edges] |
| Air taxiway | 4 [between centre lines] | 4 [between centre lines] | 1.5 [centre line to object] | 4 [centre line to edge] |

[expressed in multiples of the greatest over-all width of helicopter with rotor turning]

18.6 The surface of the ground beneath an air taxiway shall -

a. be resistant to the effects of rotor downwash; and

b. be suitable for emergency landings.

18.7 The surface of the ground beneath an air taxiway should provide ground effect.

18.8 The transverse slope of an air taxiway should not exceed 10 per cent and the longitudinal slope should not exceed 7 per cent. In any event, the slopes should not exceed the slope landing limitations of the helicopters the air taxiway is intended to serve.

## 14. **AIR TRANSIT ROUTE**

19.1 An air transit route is intended to permit the movement helicopter above the surface, normally at heights not above 30 m above ground level and at ground speeds exceeding 20 knots.

19.2 An air transit route shall only be provided at wide space locations on an aerodrome to helicopters to fly more quickly while maintaining a safe manoeuvre capability.

**19.3** An air transit route will require large amount of airspace which must be kept clear of all obstacles as well as corresponding areas of ground below them, which must be suitable and of sufficient strength to permit safe emergency landing.

19.4 The width of an air transit route shall not be less than -

a. for operations by day only, 7 times the largest rotor diameter of the helicopters for which the air transit route is intended;

b. for operations at night, 10 times the largest rotor diameter of the helicopters for which the air transit route is intended;

19.5 Any variation in the direction of the centreline of an air transit route shall not exceed 120° be designed so as not to necessitate a turn of radius less than 270 m.

19.6 An air transit routes are to be selected so as to permit autorotative or one-engine inoperative landing such that, as a minimum requirement, injury to persons on the ground or damage to property are minimized.

## 15. **APRON**

20.1 The helicopter stand shall be of sufficient size to contain a circle of diameter of at least the largest over-all dimension of the largest helicopter the stand is expected to serve.

20.2 The minimum clearance between a helicopter using a helicopter stand and an object or any aircraft in another stand shall not be less than the greatest over-all width of the helicopter that the stand is intended to serve.

20.3 When simultaneous hover operations are to be allowed, the separation distances of 4 times the greatest over-all width of the helicopter, with rotors turning, between centre points of the relevant stands are to be applied.

20.4 The slope in any direction on a helicopter stand shall not exceed 2 per cent.

## 16. LOCATION OF FATO IN RELATION OF RUNWAY OR TAXIWAY

21.1 When a FATO is located near a runway or taxiway, and simultaneous VMC operations are planned, the separation distance between the edge of a runway or taxiway and the edge of a FATO shall not be less than -

| If aeroplane mass and/or helicopter mass are | Distance between FATO edge and runway edge or taxiway edge |
|---|---|
| Up to but not including 2720 kg | 60 m |
| 2720 kg up to but not including 5760 kg | 120 m |
| 5760 kg up to but not including 100 000 kg | 180 m |
| 100 000 kg and over | 250 m |

21.2 A FATO should not be located near areas where jet engine efflux is likely to cause high turbulence or where aeroplane engine vortex wake generation is likely to exist. Thus it is considered undesirable that a FATO to be located –

a. opposite the threshold and touchdown zones of a runway;

b. within a runway strip; or

c. at taxiway intersection and aircraft holding points serving runways.

21.3 Surface of FATO located near runway or taxiway should be able to resist erosion from engine exhaust and rotor downwash and so minimize the risk of ingestion of loose materials by both aeroplane and helicopter engines.

# OBSTACLE RESTRICTION

## 17. OBSTACLE LIMITATION REQUIREMENTS

22.1 The following obstacle limitation surfaces shall be established for a precision approach FATO :

a. take-off climb surface;

b. approach surface;

c. transitional surface; and

d. conical surface.

22.2 The following obstacle limitation surfaces shall be established for a non-precision approach FATO :

a. take-off climb surface;

b. approach surface;

c. transitional surface; and

d. conical surface if an inner horizontal is not provided.

22.3 The following obstacle limitation surfaces shall be established for a non-instrument approach FATO :

a. take-off climb surface; and

b. approach surface.

22.4 A surface-level heliport shall have at least two take-off climb and approach surfaces, separated by not less than 150°. Surface-level heliport provided with one take-off climb and approach surfaces will be enforced with restrictions on its use.

22.5 The slopes of the surfaces shall not be greater than, and their dimensions not less than those specified in Appendix B to E.

22.6 All height and slope dimensions shall be relative to a datum which shall be a horizontal plane whose elevation is the elevation of the FATO.

22.7 New objects or extension of existing objects shall not be permitted above any of the surfaces in 22.1 to 22.3 above except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

22.8 Existing objects above any of the obstacle limitation surfaces in 22.1 to 22.3 should, as far as practicable be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object or, after an aeronautical study, that the object would not adversely affect the safety or significantly affect the regularity of operations of helicopters.

22.9 The application of curved take-off climb surfaces may alleviate the problems created by objects infringing these surfaces.

## 18. **APPROACH SURFACE**

23.1 The approach surface is an inclined plane or combination of planes sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

23.2 The limits of an approach surface shall comprise –

a. an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the safety area, perpendicular to the centreline of the approach surface and located at the outer edge of the safety area;

b. two side edges originating at the ends of the inner edge and –

i. for other than a precision approach FATO, diverging uniformly at a specified rate from the vertical plane containing the centreline of the FATO; or

ii. for a precision approach FATO, diverging uniformly at a specified rate from the vertical plane containing the centreline of the FATO, to a specified height above the FATO, and then diverging uniformly at a specified rate to a specified final width and continuing thereafter at that width for the remaining length of the approach surface. and

c. an outer edge horizontal and perpendicular to the centreline of the approach surface and at a specified height above the elevation of the FATO.

23.3 The elevation of the inner edge shall be the elevation of the safety area at the point the inner edge that is intersected by the centreline of the approach surface.

23.4 The slope[s] of the approach surface shall be measured in the vertical plane containing the centreline of the surface.

23.5 The areas between the inner edge of the approach surface and the safety area shall have the same characteristics as the safety area.

23.6 The approach path is to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to occupants of the helicopter, person on the ground or water or damage to property is minimized.

## 19. **TRANSITIONAL SURFACE**

24.1 The transitional surface is a complex surface along the side of the safety area and part of the side of the approach surface that slope upwards and outwards to the inner horizontal surface or a predetermined height.

24.2 The limits of a transitional surface shall comprise -

a. a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface or beginning at a specified height above the lower edge when an inner horizontal surface is not provided, an extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the side of the safety area parallel to the centreline of the FATO; and

b. an upper edge located in the plane of the inner horizontal surface, or at a specified height above the lower edge when the inner horizontal surface is not provided.

24.3 The elevation of a point on the lower edge shall be -

a. along the side of the approach surface – equal to the approach surface at that point; and

b. along the safety area – equal to the elevation of the FATO opposite that point.

24.4 The transitional surface along the safety area will be curved if the profile of the FATO is curved, or a plane if the profile is a straight line. The intersection of the transitional surface with the inner horizontal, or upper edge when an inner horizontal surface is not provided, will also be curved or a straight line depending on the profile of the FATO.

24.5 The slope of the transitional surface shall be measured in a vertical plane at right angles to the centreline of the FATO.

## 20. **INNER HORIZONTAL SURFACE**

25.1 An inner horizontal surface should be provided where straight-in non-precision instrument approaches are not available at both ends of the FATO.

25.2 The inner horizontal surface is a circular surface located in the horizontal plane above the FATO and its environs.

25.3 The radius of the inner horizontal surface shall be measured from the mid-point of the FATO.

25.4 The height of the inner horizontal surface shall be measured above an elevation datum which is the elevation of the FATO.

21. **CONICAL SURFACE**

26.1 The conical surface is a surface sloping upwards and outwards from the periphery of inner horizontal surface, or from the outer limit of the transitional surface if an inner horizontal surface is not provided.

24.6 The limits of a conical surface shall comprise -

a. a lower edge coincident with the periphery of the inner horizontal surface, or the outer limit of the transitional surface if an inner horizontal surface is not provided.

b. an upper edge located at a specified height above the inner horizontal surface, or above the elevation of the FATO if an inner horizontal surface is not provided.

26.2 The slope of the conical surface shall be measured above the horizontal.

22. **TAKE-OFF CLIMB SURFACE**

27.1 The take-off climb surface is an inclined plane, a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area an centred on a line passing through the centre of the FATO.

27.2 The limits of a take-off climb surface shall comprise –

a. an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the safety area, perpendicular to the centreline of the take-off climb surface and located at the outer edge of the safety area or clearway;

b. two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centreline of the FATO; and

c. an outer edge horizontal and perpendicular to the centreline of the take-off climb surface and at a specified height above the elevation of the FATO.

27.3 The elevation of the inner edge shall be the elevation of the safety area at the point the inner edge that is intersected by the centreline of the take-off climb surface, except when a clearway is provided, the elevation shall be equal to the highest point on the ground on the same centreline of the clearway.

27.4 In the case of straight take-off climb surface, the slope shall be measured in the vertical plane containing the centreline of the surface.

27.5 In the case of straight take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centreline and the slope of the centreline shall be the same as for a straight take-off climb surface. The portion of the surface between the inner edge and 30 m above the inner edge shall be straight.

27.6 Any variation in the direction of the centreline of the take-off climb surface shall be designed so as not to necessitate a turn of radius less than 270 m.

27.7 The departure path is to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to occupants of the helicopter, person on the ground or water or damage to property is minimized.

# VISUAL AIDS

23. A heliport meant for use by day and then only in good visibility conditions will need to display markings only. On the other hand, if the heliport is intended for use by night or in restricted visibility conditions by day or night it will need to be lighted as well.

## 24. WIND DIRECTION INDICATOR

29.1 A heliport shall be equipped with at least one wind direction indicator.

29.2 A wind direction indicator shall be constructed so that it gives a clear indication of the direction of the wind and a general indication of the wind speed.

29.3 A wind direction indicator shall be located so as to indicate the wind conditions over the final approach and take-off area and insuch a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a helicopter in flight, in a hover or on the movement area.

29.4 A wind direction indicator shall be a truncated cone made of lightweight fabric and shall have minimum dimensions of 2.4 m in length, 0.6 m diameter at larger end and 0.3 m diameter at smaller end.

29.5 The colour of the wind direction indicator should be so selected so as to make it clearly visible and understandable, having regard to background. Where practicable, a single colour, orange should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should be orange and white, or red and white, and should be arranged in five alternate bands the first and last band being the darker colour.

29.6 A wind direction indicator shall at a heliport intended for use at night shall be illuminated

## 25. MARKINGS AND MARKERS

30.1 The following markings shall be provided for a heliport -

a. heliport identification marking;

b. FATO area marking; and

c. TLOF area marking.

30.2 Under certain operational circumstances, the following markings shall also be provided for a heliport -

a. FATO area designation marking;

b. aiming point marking;

c. touchdown marking; and

d. heliport name marking.

30.3 Where provided, the following markings should be made available -

a. ground taxiway marking;

b. air taxiway markers; and

c. air transit route markers.

## 30.4 HELIPORT IDENTIFICATION MARKING

30.4.1 A heliport identification marking shall be provided at a heliport.

30.4.2 A heliport identification marking shall be located within the FATO area, at or near the centre of the area.

30.4.3 A heliport identification marking, except for a heliport at a hospital, shall consist of a letter H, white in colour. The dimensions of the marking shall be no less than those shown in Appendix F.

30.4.4 A heliport identification marking for a heliport at a hospital shall consist of a letter H, red in colour, on a white cross made of squares adjacent to each of the sides of a square containing the H as shown in Appendix F.

30.4.5 A heliport identification marking shall be orientated so that the cross arm of the H at right angles to the preferred final approach direction.

## 30.5 FATO AREA MARKING / MARKERS

30.5.1 A FATO area marking or markers shall be provided at a heliport.

30.5.2 A FATO area marking or markers shall be spaced -

a. for a square or rectangular area, at equal intervals of not more than 50 m with at least three markings on each side including a marking at each corner; and

b. for any other shaped area, including a circular area, at equal intervals of not more than 10 m with a minimum number of five markings.

30.5.3 A FATO area marking shall be a rectangular stripe with a length of 9 m or one-fifth of the side of the FATO which it defines and a width of 1 m.

30.5.4 A FATO area marker shall be a be of a form similar to that shown in Appendix G with dimensions of 3 m in length, 1m in width and 0.25 m in height.

30.5.5 Where the marking is used in conjunction with the FATO area designation marking, its dimension shall be increased by a factor of 3.

30.5.6 A FATO area marking and markers shall be white.

## 30.6 TLOF AREA MARKING

30.6.1 A TLOF area marking shall be provided at a heliport.

30.6.2 A TLOF area marking shall be located along the perimeter of the TLOF area.

30.6.3 A TLOF area marking shall be consist of a continuous white line with a width of at least 30 cm.

## 30.7 FATO AREA DESIGNATION MARKING

30.7.1 A FATO area designation marking shall be provided where it is necessary to designate the FATO area to the pilot. This marking aid identifies and distinguish one FATO from another.

30.7.2 A FATO area designation marking shall be located at the beginning of the FATO area.

30.7.3 A FATO area designation marking shall consist of a runway designation and supplemented by an H.

## 30.8 AIMING POINT MARKING

30.8.1 An aiming point marking shall be provided at a heliport where it is necessary for a pilot to make an approach to a particular point before proceeding to the TLOF area.

30.8.2 The aiming point marking shall be located within the FATO area.

30.8.3 The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach path.

30.8.4 The marking shall consist of a continuous white line as shown in Appendix H.

## 30.9 TOUCHDOWN MARKING

30.9.1 A touchdown marking shall be provided at a heliport where it is necessary for a helicopter to touchdown in a specific position.

30.9.2 A touchdown marking shall be located so that when a helicopter for which the marking is intended is positioned, with the main undercarriage inside the marking and the pilot situated over the marking, all parts of the helicopter will be clear of any obstacle by a safe margin.

30.9.3 A touchdown marking shall be a yellow circle and have a line width of at least 0.5 m.

## 30.10 HELIPORT NAME MARKING

30.10.1 A heliport name marking shall be provided at a heliport where visual identification of the heliport is necessary.

30.10.2 A heliport name marking shall be placed on the heliport so as to be visible, as far as practicable, at all angles above the horizontal.

30.10.3 A heliport name marking shall consist of the name or alphanumeric designator of the heliport as used in R/T communication.

30.10.4 The characters of the marking shall not be less than 3 m in height. The colour of the marking should contrast with the background.

30.10.5 A heliport name marking intended for use at night or during conditions of poor visibility shall be illuminated.

## 30.11 GROUND TAXIWAY MARKING

30.11.1 A helicopter taxiway should be marked with ground taxiway markings.

30.11.2 Ground taxiway marking shall be located along the centreline of the helicopter ground taxiway to provide continuous guidance to helicopter stand.

30.11.3 Ground taxiway marking shall be yellow, at least 15 cm width and continuous in length.

## 30.12 AIR TAXIWAY MARKERS

30.12.1 An air taxiway should be marked with air taxiway markers.

30.12.2 Air taxiway marking shall be located along the centreline of the air taxiway and shall be spaced an intervals of not more than 30 m on straight sections and 15 m on curves.

30.12.3 An air taxiway marker shall be frangible and when installed shall not exceed 35 cm above ground level. The surface of the marker as viewed by the pilot shall be a rectangle with height to width ratio of approximately 3:1 and shall have a minimum area of 150 $cm^2$ as shown in Appendix I.

30.12.4 An air taxiway marker shall be divided into three equal, horizontal bands coloured yellow-green-yellow, respectively. If the taxiway is to be used at night, the markers shall be internally illuminated or retro-reflective.

## 30.13 AIR TRANSIT ROUTE MARKERS

30.13.1 An air transit route should be marked with air transit route markers.

30.13.2 Air transit route markers shall be located along the centreline of the air transit route and shall be spaced an intervals of not more than 60 m on straight sections and 15 m on curves.

30.13.3 An air transit route marker shall be frangible and when installed shall not exceed 1 m above ground level. The surface of the marker as viewed by the pilot shall be a rectangle with height to width ratio of approximately 3:1 and shall have a minimum area of 1 500 $cm^2$ as shown in Appendix I.

30.13.4 An air taxiway marker shall be divided into three equal, vertical bands coloured yellow-green-yellow, respectively. If the taxiway is to be used at night, the markers shall be internally illuminated or retro-reflective.

## 26. LIGHTS

31.1 The following lights shall be provided at heliport intended for use by night or in restricted visibility condition by day or night -

a. heliport beacon;

b. FATO area lights;

c. TLOF area lights; and

d. obstacle lights.

31.2 Aiming point lights shall be provided where an aiming point is established.

31.3 Taxiway lights shall be provided where a helicopter ground taxiway is established.

31.4 Under certain operational conditions, the following lights are required at heliport intended for use by night or in restricted visibility condition by day or night -

a. approach lighting system;

b. visual alignment guidance system; and

c. helicopter approach path indicator.

## 31.5 **HELIPORT BEACON**

31.5.1 A heliport beacon shall be provided at a heliport where –

a. long-range visual guidance is considered necessary and is not provided by other visual means;

b. identification of the heliport is difficult due to surrounding lights.

31.5.2 The heliport beacon shall be located on or adjacent to the heliport preferably at an elevated position and so that it does not dazzle the pilot at short range. Where a heliport beacon is likely to dazzle pilots at short range it may be switched off during the final stages pf the approach and landing.

31.5.3 The heliport beacon shall emit repeated series of equispaced short duration white flashes in the format shown in Appendix J.

31.5.4 The lights from the beacon shall show at all angles of azimuth.

31.5.5 To ensure that pilots are not dazzled during the final stages of the approach and landing, brilliancy control with 10 per cent and 3 per cent settings or shielding should be provided.

## 31.6 **FATO AREA LIGHTS**

31.6.1 FATO area lights shall be provided except that they may be omitted where the FATO area and the TLOF area are coincidental.

31.6.2 FATO area lights shall be placed along the edges of the FATO area. The lights shall be uniformly spaced as follows -

a. for an area in the form of square or rectangle, at intervals of not more than 50 m with minimum of four lights on each side including a light at each corner;

b. for any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

31.6.3 FATO area lights shall be omni-directional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

31.6.4 FATO area lights shall not exceed a height of 25 cm and shall be inset when a light extending above the surface would endanger helicopter operations.

## 31.7 TLOF AREA LIGHTS

31.7.1 TLOF area lights shall be provided.

31.7.2 TLOF area lighting system shall consist of one or more of the following -

a. perimeter lights; or

b. floodlighting; or

c. arrays of segmented point source lighting [ASPSL] or luminescent panel [LP] when perimeter lights and floodlighting are not practicable and FATO area lights are available.

31.7.3 TLOF area perimeter lights shall be placed along the edge of the TLOF area or within a distance of 1.5 m from the edge.

31.7.4 Where the TLOF area is a circle, the perimeter lights shall be -

a. located on straight lines in a pattern which will provide information to pilot on drift displacement; and

b. where, the above is not practicable, evenly spaced around the perimeter of the TLOF at an appropriate interval.

31.7.5 TLOF area perimeter lights shall be spaced -

a. uniformly at intervals of not more than 5 m. with a minimum of four lights on each side including a light at each corner;

b. evenly, where lights are arranged in a circle, with a minimum of fourteen lights.

31.7.6 TLOF area perimeter lights shall be fixed omni-directional lights showing green.

31.7.7 TLOF area perimeter lights shall be inset.

31.7.8 ASPSL or LP lights, if provided to identify FATO/TLOF, shall be placed along the edge of the FATO/TLOF area except for a circular FATO/TLOF the ASPSL or LP lights shall be located on straight lines circumscribing the area.

31.7.9 LP lights shall meet the following requirements –

a. the minimum number of panels shall be twelve;

b. the total length of panels in a pattern shall not be less than 50 per cent of the length of the pattern;

c. there shall be an odd number with minimum of three panels on each side of the TLOF area including a panel at each corner; and

d. the panels shall be equispaced with a distance between adjacent panel ends of not more than 5 m.

31.7.10 LP lights, when used to define the perimeter of FATO/TLOF, shall be fixed omni-directional lights showing green.

31.7.11 LP lights shall not extend above the surface by more than 2.5 cm.

31.7.12 LP lights shall have a minimum width of 6 cm. The panel housing shall have the same colour as the marking it defines.

31.7.13 TLOF floodlighting shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

## 31.8 OBSTACLE LIGHTS

31.8.1 Specification on lighting of obstacles included in ASD 402, are equally applicable to heliports.

31.8.2 Obstacles shall be floodlighted if it is not possible to display lights on them.

## 31.9 AIMING POINT LIGHTS

31.9.1 Where an aiming point is provided at a heliport intended for use at night, aiming point lights shall be provided.

31.9.2 Aiming point lights shall be collocated with the aiming point marking.

31.9.3 Aiming point lights shall form a pattern of at least six omni directional white lights as shown in Appendix G.

31.9.4 Aiming point lights shall be inset.

## 31.10 TAXIWAY LIGHTS

31.10.1 Taxiway meant for ground taxiing of helicopters shall be lighted in the same manner as a taxiway meant for use by aeroplanes.

## 31.11 APPROACH LIGHTING SYSTEM

31.11.1 For non-instrument approaches, an approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction or to enhance closure rate information to pilots.

31.11.2 For instrument approaches, an approach lighting system shall be provided to provide approach guidance.

31.11.3 For non-instrument approaches, an approach lighting system shall consist of a row of three lights spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the FATO area as shown in Appendix J. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by , the line of the centreline lights and spaced at 4.5 m intervals. Where there is a need to make the final approach course more conspicuous additional lights spaced uniformly at 30 m should be added beyond the crossbar.

31.11.4 For instrument approaches, an approach lighting system shall consist of a row of at least seven lights extending not less 210 m from the perimeter of the FATO area. The lights are spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the FATO area as shown in Appendix K. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by , the line of the centreline lights and spaced at 4.5 m intervals.

31.11.5 The lights shall be omni directional steady white lights except beyond the crossbar either omni directional steady or flashing white lights may be used.

31.11.6 Sequenced flashing lights may be useful where identification of the approach lighting system is difficult due to surrounding lights. The flashing lights should have flash frequency of one per second. The flash sequence should commence from the outermost light and progress towards the crossbar.

31.11.7 A suitable brilliancy control should be incorporated to allow for adjustment of light intensity to meet prevailing conditions -

a. steady lights : 100 per cent, 30 per cent and 10 per cent; and

b. flashing lights : 100 per cent, 10 per cent and 3 per cent.

## 31.12 **VISUAL ALIGNMENT GUIDANCE SYSTEM**

31.12.1 A visual alignment guidance system should be provided to serve the approach to a heliport where one of the following conditions exists -

a. obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

b. the environment of the heliport provides few visual surface cues; and

c. it is physically impracticable to install an approach lighting system.

31.12.2 A visual alignment guidance system shall be located such that a helicopter is guided along the prescribed track towards the FATO area, preferably at the downwind edge of the FATO area.

31.12.3 The light unit shall be frangible and mounted as low as possible.

31.12.4 Where the lights of the system needs to be seen as discrete sources, light units shall be located such that at the extremes of system coverage the angle subtended between units as seen by the pilots shall not be less than 3 minutes of arc.

31.12.5 The angles subtended between light units of the system and other units comparable or greater intensities shall also not be less than 3 minutes of arc.

31.12.6 The signal format of the alignment guidance system shall include a minimum of three discrete signal sectors providing “offset to the right”, “on track” and “offset to the left” signals.

31.12.7 The signal format of the alignment guidance system shall be such that there is no possibility of confusion between the system and any associated visual approach slope indicator or other visual aids.

31.12.8 The system shall avoid the use of same coding as any associated visual approach slope indicator.

31.12.9 The signal format shall be such that the system is unique and conspicuous in all operational environments.

31.12.10 The useable coverage of the alignment guidance system shall equal to or better than that of the visual approach slope indicator system, with which it is associated.

31.12.11 A suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilots during approach and landing.

31.12.12 An alignment guidance system shall be capable of adjustment in azimuth to within ± 5 minutes of arc of the desired approach path.

31.12.13 The angle of azimuth of alignment guidance system shall be such that during an approach a helicopter at the boundary of the “on track” signal will clear all objects in the approach area by a safe margin.

31.12.14 The characteristic of the obstacle protection surface is as follows –

| SURFACE AND DIMENSIONS | | NON-INSTRUMENT FATO | INSTRUMENT FATO |
|---|---|---|---|
| Length of inner edge | | Width of safety area | Width of safety area |
| Distance from end of FATO | | 3 m minimum | 60 m |
| Divergence | | 10% | 15% |
| Total length | | 2 500 m | 2 500 m |
| Slope | PAPI | 0.57º | 0.57º |
| | HAPI | 0.65º | 0.65º |
| | APAPI | 0.9º | 0.9º |

31.12.15 New objects or extension of existing objects shall not be permitted above the obstacle protection surface, except when, in the opinion of the authority, the new object or extension would be shielded by an existing immovable object.

31.12.16 Existing objects above an obstacle protection surface shall be removed, except when, in the opinion of the authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of helicopters.

31.12.17 In the event of the failure of any component affecting the signal format the system will automatically switched off.

31.12.18 The light units shall be so designed that deposits of condensation on optical transmitting or reflecting surface will interfere to the least possible extent with the light signal and will not cause spurious or false signals to be generated.

31.12.19 A flight inspection of a new installation shall be conducted to confirm the correct operation of the system.

31.12.20 A routine scheduled inspection shall be made to ensure the correct operation of the system.

## 31.13 **HELICOPTER APPROACH PATH INDICATOR**

31.13.1 A helicopter approach path indicator should be provided to serve the approach to a heliport where one of the following conditions exists -

a. obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

b. the environment of the heliport provides few visual surface cues; and

c. the characteristic of the helicopter require a stabilized approach.

31.13.2 A HAPI shall be located such that a helicopter is guided to the desired position within the FATO area, adjacent to the nominal aiming point and aligned in azimuth with the preferred approach direction.

31.13.3 The light unit shall be frangible and mounted as low as possible.

31.13.4 The signal format of the HAPI shall include four discrete signal sectors providing an “above slope”, an “on slope”, a “slightly below” and a “below slope” signal.

31.13.5 The signal format of the HAPI shall be shown as in Appendix N.

31.13.6 The signal repetition rate of the flashing sector of the HAPI shall be at least 2 Hz.

31.13.7 The angular size of the “on slope” sector of the HAPI shall be 45 minutes.

31.13.8 The angular size of the “slightly below” sector of the HAPI shall be 15 minutes.

31.13.9 Colour transition of the HAPI in the vertical plane shall be such as appear to an observer at a distance of not less than 300 m to occur within a vertical range of not more than three minutes.

31.13.10 The transmission factor of a red or green filter shall not be less than 15 per cent at the maximum intensity.

31.13.11 A full intensity of the red light of the HAPI shall have a Y-coordinate not exceeding 0.320.

31.13.12 A full intensity of the green light of the HAPI shall be within the following boundaries -

| | |
|---|---|
| Yellow boundary | $y = 0.726 – 0.726x$ |
| White boundary | $x = 0.625y – 0.041$ |
| Blue boundary | $y = 0.390 – 0.171x$ |

31.13.13 A suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilots during approach and landing

31.13.14 A HAPI system shall be capable of adjustment in elevation at any desired angle between 1 degree and 12 degrees above the horizontal with an accuracy of ± 5 minutes of arc.

31.13.15 The angle of azimuth of elevation setting of HAPI shall be such that during an approach a helicopter at the upper boundary of the "below slope" signal will clear all objects in the approach area by a safe margin.

31.13.16 In the event of vertical misalignment of a unit exceeds ± 0.5º, the will automatically switched off or if the flashing mechanism fail, no light will be emitted in the failed flashing sector(s).

31.13.17 The light units shall be so designed that deposits of condensation on optical transmitting or reflecting surface will interfere to the least possible extent with the light signal and will not cause spurious or false signals to be generated.

31.13.18 An obstacle protection surface shall be established when it is intended to provide HAPI or other visual approach slope indicator.

31.13.19 The characteristic of the obstacle protection surface is as follows –

| SURFACE AND DIMENSIONS | | NON-INSTRUMENT FATO | INSTRUMENT FATO |
|---|---|---|---|
| Length of inner edge | | Width of safety area | Width of safety area |
| Distance from end of FATO | | 3 m minimum | 60 m |
| Divergence | | 10% | 15% |
| Total length | | 2 500 m | 2 500 m |
| Slope | PAPI | 0.57º | 0.57º |
| | HAPI | 0.65º | 0.65º |
| | APAPI | 0.9º | 0.9º |

31.13.20 New objects or extension of existing objects shall not be permitted above the obstacle protection surface, except when, in the opinion of the authority, the new object or extension would be shielded by an existing immovable object.

31.13.21 Existing objects above an obstacle protection surface shall be removed, except when, in the opinion of the authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of helicopters.

31.13.22 When aeronautical study indicates that existing objects extending above obstacle protection surface could adversely affect the operations of helicopters, one or more of the following measures shall be taken -

a. suitably raise the approach slope of the system;

b. reduce the azimuth spread of the system so that the object is outside the confines of the beam;

c. displace the axis of the system and its associated obstacle protection surface by no more than 5°;

d. suitably displace the FATO area; and

e. install a visual alignment guidance system.

# RESCUE AND FIRE FIGHTING

## 27. LEVEL OF PROTECTION

32.1 The level of protection to be provided for rescue and fire fighting shall be based on the over-all length of the longest helicopter normally using the heliport and in accordance with the heliport fire fighting category.

| Category | Helicopter over-all length * |
|---|---|
| H1 | up to but not including 15 m |
| H2 | from 15 m up to but not including 24 m |
| H3 | from 24 m up to but not including 35 m |

* Helicopter length including the tail boom and rotors

32.2 During anticipated periods of operations by smaller helicopters, the heliport fire fighting category may be reduced to that of the highest category of helicopter planned to use the heliport during that time.

32.3 In the case of a heliport located on an aerodrome, it may be assumed that the rescue and fire fighting services and equipment provided for aeroplanes will be at least equal to those required for the longest helicopter normally using the facility and that the response time to the helicopter does not exceed two minutes.

## 28. EXTINGUISHING AGENTS

33.1 The principal extinguishing agent shall be a foam meeting the minimum performance level B.

33.2 The amounts of water for foam production and the complementary agents to be provided shall be in accordance with the heliport fire fighting category.

| Category | Foam meeting Performance level B | | Complementary agents | |
|---|---|---|---|---|
| | **Water [L]** | **Discharge rate foam solution [L/min]** | **Dry chemical powders [kg]** | **or $CO_2$** |
| H1 | 500 | 250 | 23 | 45 |
| H2 | 1 000 | 500 | 45 | 90 |
| H3 | 1 600 | 800 | 90 | 180 |

33.3 It is permissible to replace all or part of the amount of water for foam production by complementary agent. The following equivalent shall be used -

| | | |
|---|---|---|
| 1 kg. dry chemical powder or 2 kg. $CO_2$ | = | 0.66 L water for production of foam meeting performance level B |

29. **RESPONSE TIME**

34.1 A response time not exceeding two minutes in optimum conditions of visibility and surface conditions shall be achieved.

30. **RESCUE EQUIPMENT**

35.1 Rescue equipment commensurate with the level of helicopter operations shall be provided as follows -

| | Heliport HF category | |
|---|---|---|
| **Equipment** | **H1 and H2** | **H3** |
| Adjustable wrench | 1 | 1 |
| Axe, rescue, non-wedge or aircraft type | 1 | 1 |
| Cutters, bolt, 60 cm | 1 | 1 |
| Crowbar, 105 cm | 1 | 1 |
| Hook, grab or slaving | 1 | 1 |
| Hacksaw, heavy duty complete with 6 spare blades | 1 | 1 |
| Blanket, fire resistant | 1 | 1 |
| Ladder, length appropriate to Helicopter in use | - | 1 |
| Lifeline, 5 cm, 15 m in length | 1 | 1 |
| Pliers, side cutting | 1 | 1 |
| Set of assorted screwdrivers | 1 | 1 |
| Harness knife complete with sheath | 1 | 1 |
| Gloves, fire resistant | 2 pairs | 3 pairs |
| Power cutting tool | - | 1 |

# DEVIATIONS

31. The Department of Civil Aviation shall notify and publish deviations from any Standards and Recommended Practices contained in ICAO Annex 14 in the Aeronautical Information Services publications in compliance to the Article 38 of the Convention on International Civil Aviation.

32. The Appendices to this Directive shall be taken, construed, read and be part of this Directive.

**DATO' IR. KOK SOO CHON**
**Director General**
**Department of Civil Aviation**
**Malaysia**

**Dated: 22 September 2005**

# AMENDMENT RECORD

| Amendment Number | Amendment Date | Incorporated by | Incorporated on |
|---|---|---|---|
| 1/2006 | 4 Jan 2006 | Para 2 | 4 Jan 2006 |
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APPENDIX A

# PARTICULARS TO BE INCULDED IN AN AERODROME MANUAL

## PART I : GENERAL

General information, including the following –

a. name of heliport owner/operator, and address and telephone number[s] at which the owner/operator can be contacted at all times;

b. purpose and scope of the aerodrome manual;

c. the condition for use of the heliport, including operational limitation and restriction;

d. the system for recording aircraft movements; and

e. obligations of the heliport owner/operator.

## PART 2 : PARTICULARS OF THE HELIPORT SITE

General information, including the following –

a. a plan of the heliport showing the main heliport facilities, including visual aids and non-visual aids provided;

b. a plan showing the approach surfaces and take-off surfaces, and obstacles, within 1000 m radius of the heliport; and

c. a plan showing the position of the heliport in relation to other infrastructure and terrain within 5000 m radius of the heliport.

## PART 3 : PARTICULARS OF THE HELIPORT

### 3.1 GENERAL INFORMATION

a. the name of the heliport;

b. the type of the heliport;

c. the location of the heliport from the nearest town and nearest aerodrome;

d. the geographical coordinates of the heliport reference point [WGS-84];

e. the elevation of the heliport; and

f. details of heliport beacon [if provided].

## 3.2 HELIPORT DIMENSIONS

a. FATO – type, dimension, true bearing and designation number;

b. TLOF – type, dimension, slope and bearing strength in tonnes;

c. safety area – type and dimension;

d. clearway – dimension and ground profile;

e. ground taxiway, air taxiway and air transit route – designation, width and surface type;

f. apron – surface type and helicopter stands.

## 3.3 GEOGRAPHICAL COORDINATES

a. geometric centre of TLOF;

b. geometric centre of threshold[s] of FATO;

c. ground taxiway, air taxiway and air transit route centerline points;

d. helicopter stands; and

e. significant obstacles in the approach and take-off paths, and the top elevation.

## 3.4 DECLARED DISTANCES

a. take-off distance available;

b. rejected take-off distance available; and

c. landing distance available.

## 3.5 VISUAL AIDS

a. visual aids viz. markings and lighting

b. wind direction indicator;

c. VAGS;

d. HAPI.

## 3.6 RESCUE AND FIRE FIGHTING

a. level of protection.

## PART 4 : HELIPORT OPERATIONS PROCEDURES

### 4.1 ATC COORDINATION PROCEDURES

Particulars of procedures for coordination with Air Traffic Services Unit[s], including –

a. procedures for arrivals;
b. procedures for departures; and
c. communication facilities provided.

### 4.2 HELIPORT REPORTING PROCEDURES

Particulars of procedures for notifying any changes to the infrastructure, facilities and operational procedures, including –

a. arrangement for reporting changes; and
b. recording of changes.

### 4.3 ACCESS TO HELIPORT AREA

Procedure for the preventing of the unauthorized entry of person[s], vehicles or others into the heliport area including facilities provided to prevent such occurrence.

### 4.4 HELIPORT EMERGENCY PLAN

Particulars of the heliport emergency plan, including the following –

a. plans for dealing with emergencies occurring at the heliport or in its vicinity;
b. details of test for equipment to be used in emergencies, including frequency of those tests; and
c. details of exercise to test the emergency plan, including the frequency of those exercises.

### 4.5 RESCUE AND FIRE FIGHTING

Particulars of facilities, equipment, personnel and procedures for meeting the rescue and fire fighting requirements.

### 4.6 INSPECTION OF HELIPORT

Particulars of procedures for the inspection of the heliport area and obstacle limitation surfaces, including –

a. details of inspection intervals and times;
b. inspection checklist and logbook; and
c. reporting of inspection findings and correction of unsafe conditions.

## 4.7 VISUAL AIDS AND ELECTRICAL SYSTEMS

Particulars of procedures for the inspection and maintenance, aeronautical lights [including obstacle lights], signs, markers and electrical systems –

a. arrangements for inspection;
b. reporting and recording of inspection findings;
c. correction of deficiencies;
d. arrangements for routine maintenance; and
e. arrangements secondary power supply.

## 4.8 MAINTENANCE OF HELIPORT AREA

Particulars of procedures for the inspection and maintenance of heliport area –

a. arrangements for inspection;
b. maintenance of paved areas;
c. maintenance of unpaved areas;
d. maintenance of markings; and
e. maintenance of drainage.

## 4.9 HELIPORT SAFETY MANAGEMENT

Particulars of procedures to ensure safety during heliport operations -

a. helicopter arrival procedures [including engine shut-down];
b. helicopter departing procedure [including engine-start];
c. fuelling procedures and safety precautions;
d. protection from rotor downwash;
e. apron sweeping and cleaning;
f. arrangements for reporting incidents and accidents; and
g. personnel safety procedures.

## 4.10 OBSTACLE CONTROL

Particulars setting out the procedures for -

a. controlling obstacles within the authority of owner;
b. monitoring development within the obstacle limitation surfaces; and
c. coordination for controlling new developments in vicinity of the heliport.

## 4.11 REMOVAL OF DISABLED AIRCRAFT

Particulars of the procedures for removing of a disabled aircraft, including -

a. role of heliport owner and holder of the aircraft certificate of registration;
b. arrangements for notifying holder of the aircraft certificate of registration; and

c. arrangements for obtaining equipment and personnel to remove aircraft.

## 4.12 HANDLING OF HAZARDOUS MATERIALS

Particulars of the procedures for safe handling and storage of hazardous materials, including -

a. Arrangements for special areas on the heliport for storage of inflammable liquids [including aviation fuel] and other hazardous material; and
b. method for the delivery, storage, dispensing and handling of hazardous material.

## 4.13 PROTECTION OF NAVAIDS

Particulars of the procedures for the protection of sites for radio navigational aids –

a. arrangements for controlling activities in vicinity of navaids installations;
b. arrangements for ground maintenance of these installations; and
c. arrangements for the installation of signs warning of radiation.

# PART 5 : HELIPORT ADMINISTRATION

Particulars of the heliport administration, including –

a. the heliport organizational chart showing the name and position of key personnel;

b. the duty-list and responsibilities of key personnel, in particular the Heliport Manager and Heliport Duty Officer; and

c. the name and telephone number of the Heliport Manager.

APPENDIX B

# DIMENSION AND SLOPES
# OBSTACLE LIMITATION SURFACES

## NON-INSTRUMENT AND NON PRECISION FATO

| Surface and dimension | Non-instrument [visual] FATO — Helicopter performance class 1 | 2 | 3 | Non-Precision [instrument approach] FATO |
|---|---|---|---|---|
| **APPROACH** | | | | |
| Width of inner edge | Width of safety area boundary | | | Width of safety area boundary |
| Location of inner edge | | | | |
| **First section** | | | | |
| Divergence : day / night | 10% / 15% | 10% / 15% | 10% / 15% | 16% |
| Length : day / night | 245 m ❶ / 245 m ❶ | 245 m ❶ / 245 m ❶ | 245 m ❶ / 245 m ❶ | 2 500 m |
| Outer width : day / night | 49 m ❷ / 73.5 m ❷ | 49 m ❷ / 73.5 m ❷ | 49 m ❷ / 73.5 m ❷ | 890 m |
| Slope [maximum] | 8% ❶ | 8% ❶ | 8% ❶ | 3.33 % |
| **Second section** | | | | |
| Divergence : day / night | 10% / 15% | 10% / 15% | 10% / 15% | - |
| Length : day / night | ❸ | ❸ | ❸ | - |
| Outer width : day / night | ❹ | ❹ | ❹ | - |
| Slope [maximum] | 12.5% | 12.5% | 12.5% | - |
| **Third section** | | | | |
| Divergence | parallel | parallel | parallel | - |
| Length : day / night | ❺ | ❺ | ❺ | - |
| Outer width : day / night | ❹ | ❹ | ❹ | - |
| Slope [maximum] | 15% | 15% | 15% | - |
| **INNER HORIZONTAL** | | | | |
| Height | - | - | - | 45 m |
| Radius | - | - | - | 2 000 m |
| **CONICAL** | | | | |
| Slope | - | - | - | 5% |
| Height | - | - | - | 55 m |
| **TRANSITIONAL** | | | | |
| Slope | - | - | - | 20% |
| Height | - | - | - | 45 m |

❶ Slope and length enables helicopters to decelerate for landing while observing “avoid” areas
❷ The width of the inner edge shall be added to this dimension
❸ Determined by the distance from the inner edge to the point where the divergence produces a width of 7 rotor diameters for day operations and 10 rotor diameters for night operations
❹ Seven rotor diameters for day operations and 10 rotor diameters for night operations
❺ Determined by the distance from the inner edge to where the approach surface reaches a height of 150 m above the elevation of the inner edge

APPENDIX C

# DIMENSION AND SLOPES
# OBSTACLE LIMITATION SURFACES

## PRECISION APPROACH FATO

| | 3° approach | | | | 6° approach | | | |
|---|---|---|---|---|---|---|---|---|
| | Height above FATO | | | | Height above FATO | | | |
| Surface and dimension | 90 m [300 ft] | 60 m [200 ft] | 45 m [150 ft] | 30 m [100 ft] | 90 m [300 ft] | 60 m [200 ft] | 45 m [150 ft] | 30 m [100 ft] |
| **APPROACH** | | | | | | | | |
| Length of inner edge | 90 m | 90 m | 90 m | 90 m | 90 m | 90 m | 90 m | 90 m |
| Distance from end of FATO | 60 m | 60 m | 60 m | 60 m | 60 m | 60 m | 60 m | 60 m |
| Divergence each side to height above FATO | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% |
| Distance to height above FATO | 1 745 m | 1 163 m | 872 m | 581 m | 870 m | 580 m | 435 m | 290 m |
| Width at height avbove FATO | 962 m | 671 m | 562 m | 380 m | 521 m | 380 m | 307.5 m | 235 m |
| Divergence to parallel section | 15% | 15% | 15% | 15% | 15% | 15% | 15% | 15% |
| Width of parallel section | 2 793 m | 3 763 m | 4 246 m | 4 733 m | 4 250 m | 4 733 m | 4 975 m | 5 217 m |
| Distance to outer edge | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m |
| Width at outer edge | 5 462 m | 5 074 m | 4 882 m | 4 686 m | 3 380 m | 3 187 m | 3 090 m | 2 993 m |
| Width at outer edge | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m | 1 800 m |
| Slope of first section | 2.5% | 2.5% | 2.5% | 2.5% | 5% | 5% | 5% | 5% |
| Length of first section | 3 000 m | 3 000 m | 3 000 m | 3 000 m | 1 500 m | 1 500 m | 1 500 m | 1 500 m |
| Slope of second section | 3% | 3% | 3% | 3% | 6% | 6% | 6% | 6% |
| Length of second section | 2 500 m | 2 500 m | 2 500 m | 2 500 m | 1 250 m | 1 250 m | 1 250 m | 1 250 m |
| Total length of surface | 10 000 m | 10 000 m | 10 000 m | 10 000 m | 8 500 m | 8 500 m | 8 500 m | 8 500 m |
| **CONICAL** | | | | | | | | |
| Slope | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| Height | 55 m | 55 m | 55 m | 55 m | 55 m | 55 m | 55 m | 55 m |
| **TRANSITIONAL** | | | | | | | | |
| Slope | 14.3% | 14.3% | 14.3% | 14.3% | 14.3% | 14.3% | 14.3% | 14.3% |
| Height | 45 m | 45 m | 45 m | 45 m | 45 m | 45 m | 45 m | 45 m |

APPENDIX D

# DIMENSION AND SLOPES
# OBSTACLE LIMITATION SURFACES

## STRAIGHT TAKE-OFF

| | Non-instrument [visual] | | | Instrument |
|---|---|---|---|---|
| | Helicopter performance class | | | |
| Surface and dimension | 1 | 2 | 3 | |
| **TAKE-OFF CLIMB** | | | | |
| Width of inner edge | | Width of safety area | | 90 m |
| Location of inner edge | | Boundary or end of clearway | | Boundary or end of clearway |
| **First section** | | | | |
| Divergence : day / night | 10% / 15% | 10% / 15% | 10% / 15% | 30% |
| Length : day / night | ❶ | 245 m ❷ / 245 m ❷ | 245 m ❷ / 245 m ❷ | 2 850 m |
| Outer width : day / night | ❸ | 49 m ❹ / 73.5 m ❹ | 49 m ❹ / 73.5 m ❹ | 1 800 m |
| Slope [maximum] | 4.5% * | 8% ❷ | 8% ❷ | 3.5 % |
| **Second section** | | | | |
| Divergence : day / night | parallel | 10% / 15% | 10% / 15% | parallel |
| Length : day / night | ❺ | ❶ | ❶ | 1 510 m |
| Outer width : day / night | ❸ | ❸ | ❸ | 1 800 m |
| Slope [maximum] | 4.5% | 15% | 15% | 3.5% * |
| **Third section** | | | | |
| Divergence | - | parallel | parallel | parallel |
| Length : day / night | - | ❺ | ❺ | 7 640 m |
| Outer width : day / night | - | ❸ | ❸ | 1 800 m |
| Slope [maximum] | - | 15% | 15% | 2% |

❶ Determined by the distance from the inner edge to the point where the divergence produces a width of 7 rotor diameters for day operations and 10 rotor diameters for night operations
❷ Slope and length enables helicopters to decelerate for landing while observing “avoid” areas The width of the inner edge shall be added to this dimension
❸ Seven rotor diameters for day operations and 10 rotor diameters for night operations
❹ The width of the inner edge shall be added to this dimension
❺ Determined by the distance from the inner edge to where the approach surface reaches a height of 150 m above the elevation of the inner edge

* This slope exceeds the maximum mass one-engine-inoperative climb gradient of many helicopters which are currently operating.

APPENDIX E

# CRITERIA FOR CURVED TAKE-OFF CLIMB / APPROACH AREA

## NON-INSTRUMENT FINAL APPROACH AND TAKE-OFF

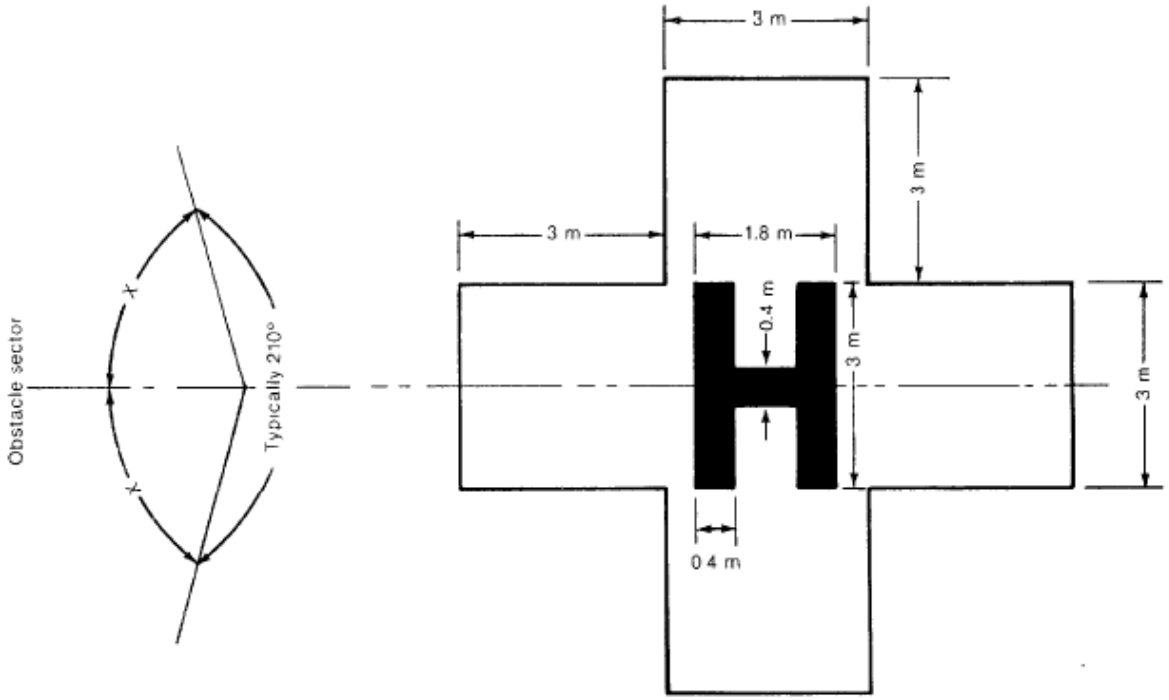
| Facility | Requirement |
|---|---|
| Directional change | As required [120° max.] |
| Radius of turn on centreline | Not less than 270 m. |
| Sistance to inner gate * | a. For performance class 1 helicopters – not less than 305 m from end of safety area or helicopter clearway.<br>b. For performance class 2 and 3 helicopters – not less than 370 m from end of FATO. |
| Width of inner gate | For day use<br>Width of inner edge plus 20% of distance to inner gate.<br>For night use<br>Width of inner edge plus 30% of distance to inner gate. |
| Width of outer gate | For day use<br>Width of inner edge plus 20% of distance to inner gate out to minimum width of 7 rotor diameters.<br>For night use<br>Width of inner edge plus 30% of distance to inner gate out to minimum width of 10 rotor diameters. |
| Elevation of inner and outer gates | Determined by the distance from the inner edge and the designated gradient[s]. |
| Slope | As in Appendix A, B or C. |
| Divergence | As in Appendix A, B or C. |
| Total length of area | As in Appendix A, B or C. |

* This is the minimum distance required prior to initiating a turn after take-off or completing a turn in the final phase

Note : More than one turn may be necessary in the total length of the take-off climb / approach area. The same criteria will apply for each subsequent turn except that the widths of the inner and outer gates would normally be the maximum width of the area.

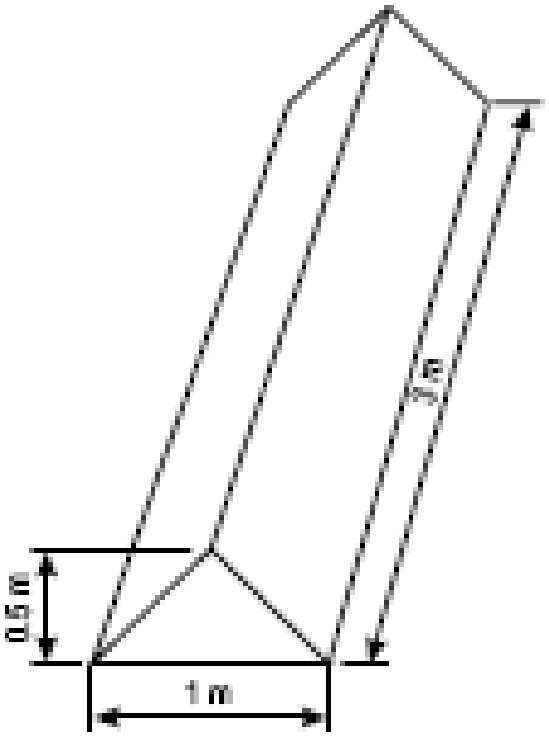
APPENDIX F

# HELIPORT IDENTIFICATION MARKING
[shown with hospital cross]



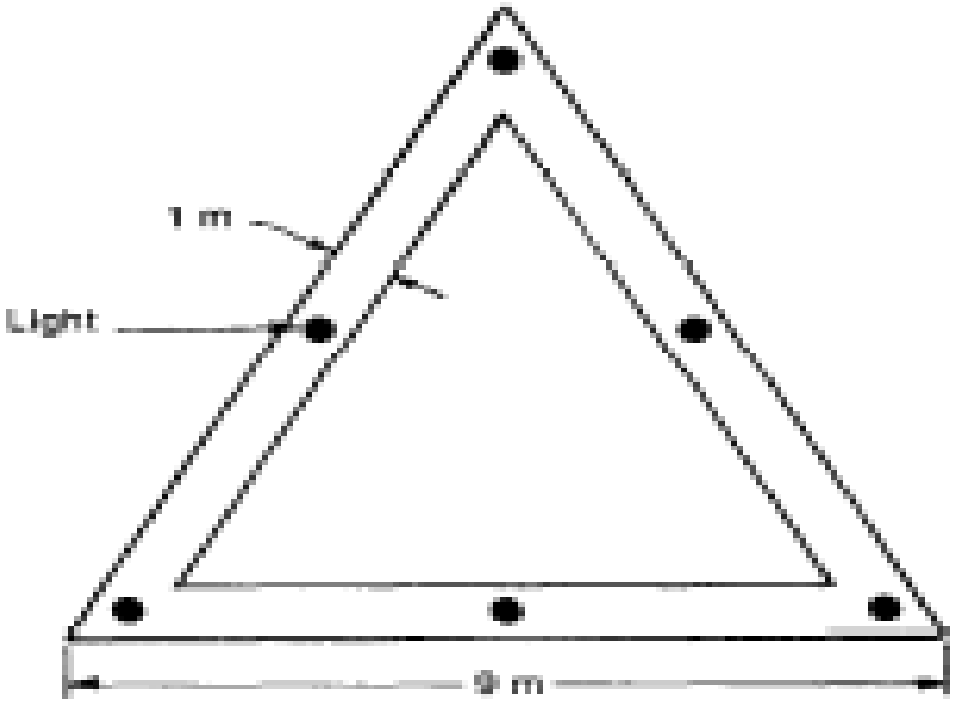
APPENDIX G

# FATO AREA MARKER



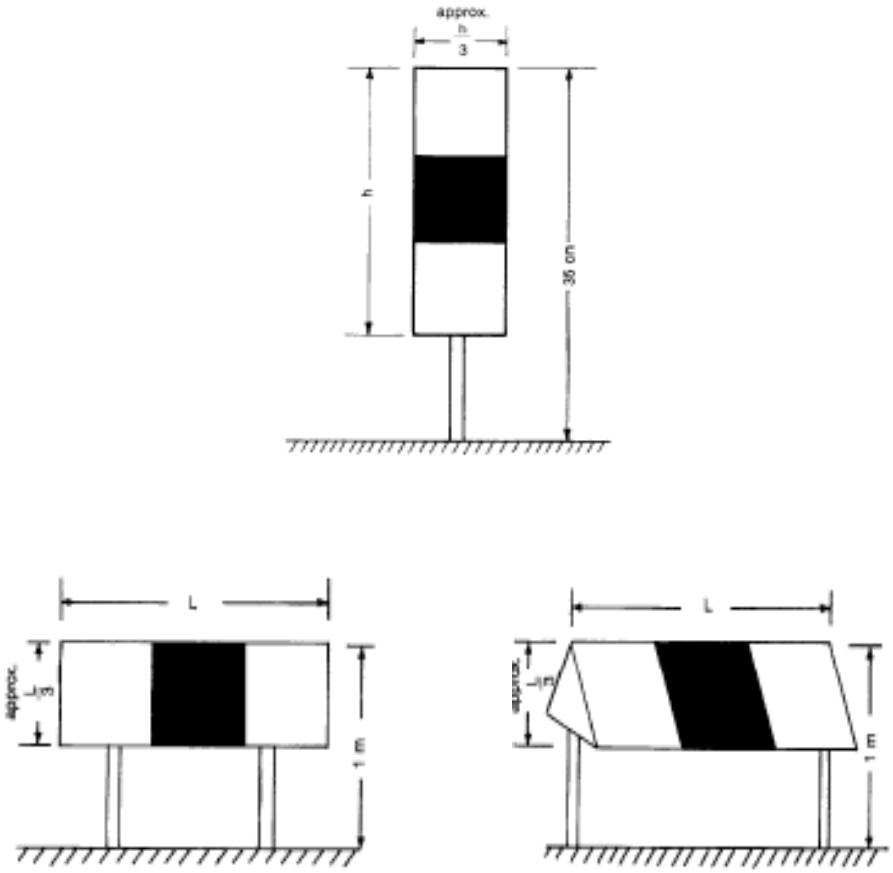
APPENDIX H

# AIMING POINT MARKING



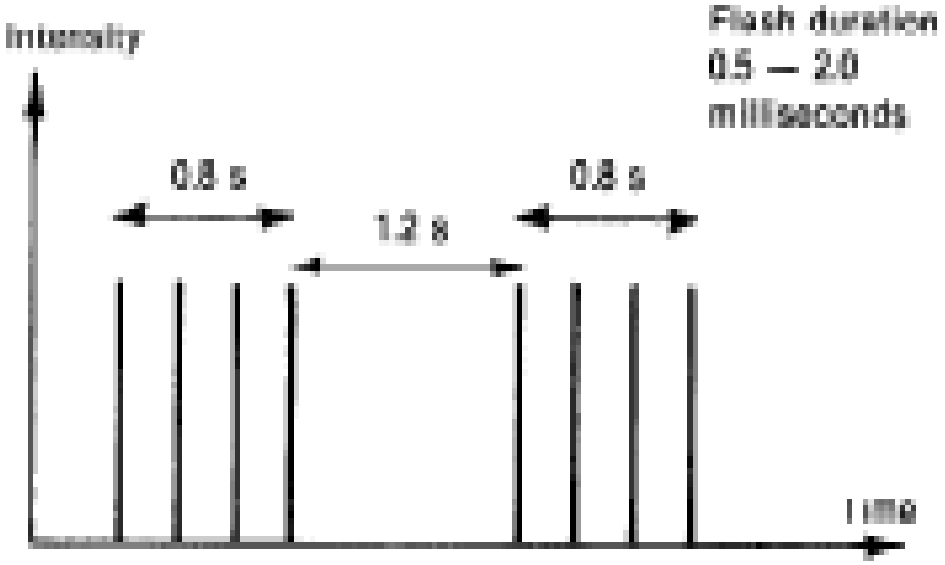
APPENDIX I

# AIR TAXIWAY AND AIR TRANSIST ROUTE MARKERS



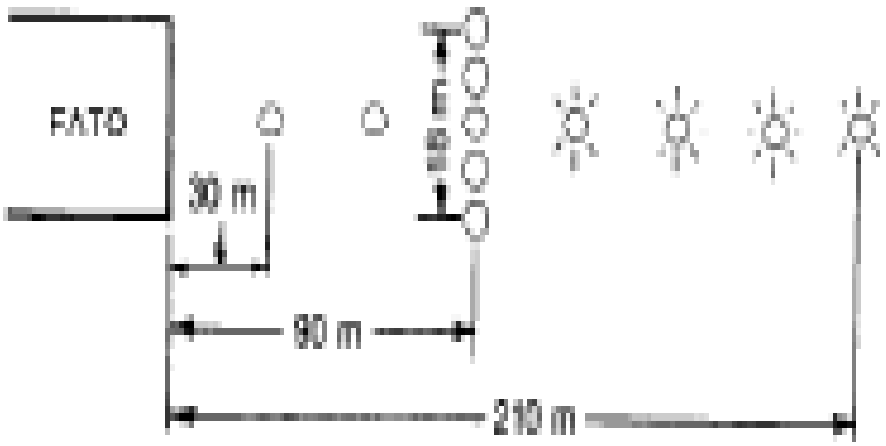
APPENDIX J

# HELIPORT BEACON FLASH CHARACTERISTICS



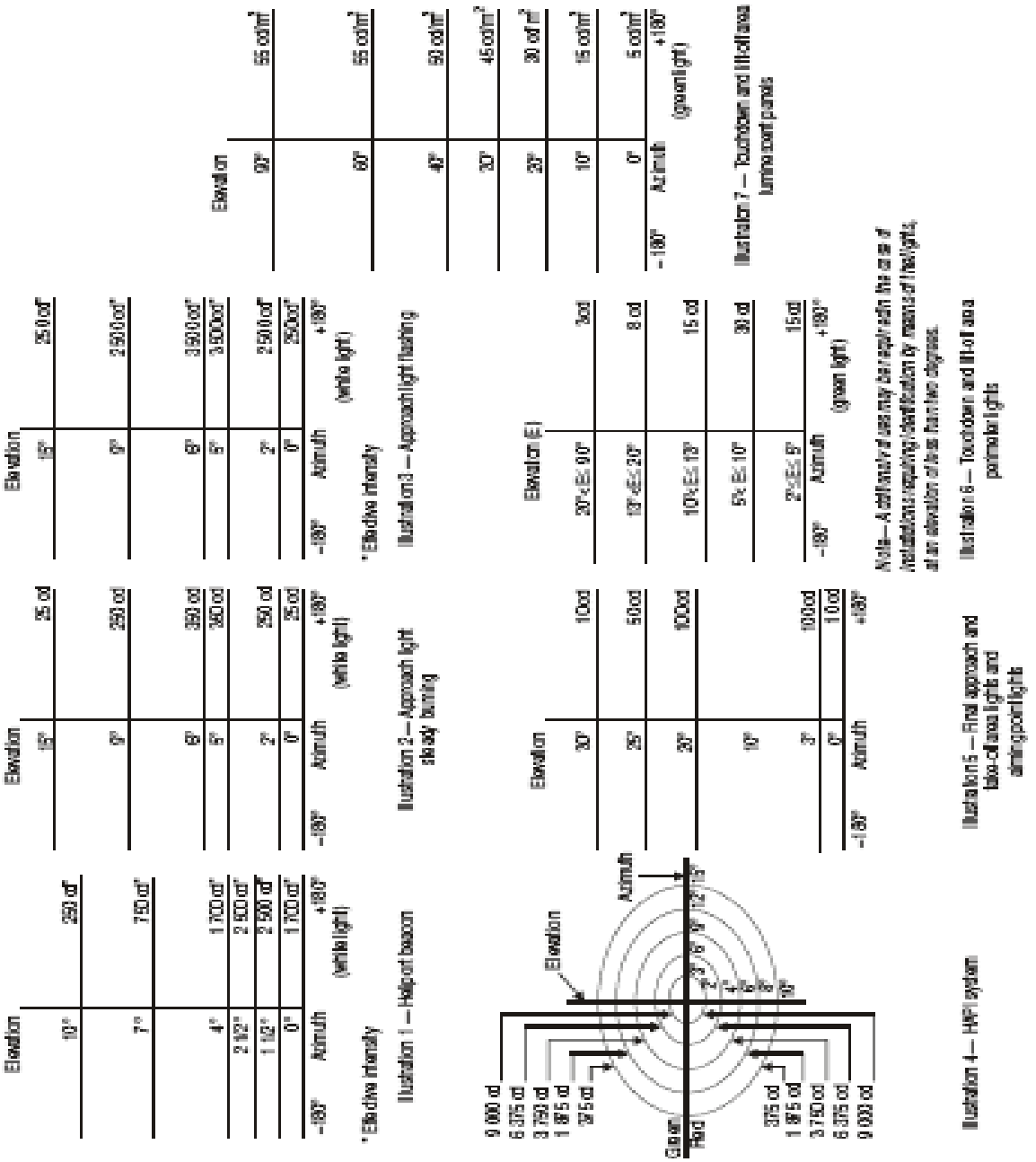
APPENDIX K

# APPROACH LIGHTING SYSTEM



APPENDIX L

# ISOCANDELA DIAGRAMS OF LIGHTS FOR HELIPORTS



| Elevation | 10° | 7° | 4° | 2 1/2° | 1 1/2° | 0° |
|---|---|---|---|---|---|---|
| | 250 cd | 750 cd | 1 700 cd* | 2 500 cd* | 2 500 cd* | 1 700 cd* |
| -180° Azimuth +180° (white light) | | | | | | |

* Effective intensity

Illustration 1 — Helicopter beacon

| Elevation | 15° | 9° | 6° | 5° | 2° | 0° |
|---|---|---|---|---|---|---|
| | 25 cd | 250 cd | 350 cd | 450 cd | 250 cd | 25 cd |
| -180° Azimuth +180° (white light) | | | | | | |

Illustration 2 — Approach light steady burning

| Elevation | 15° | 9° | 6° | 5° | 2° | 0° |
|---|---|---|---|---|---|---|
| | 250 cd* | 2500 cd* | 3500 cd* | 3500 cd* | 2500 cd* | 250 cd* |
| -180° Azimuth +180° (white light) | | | | | | |

* Effective intensity

Illustration 3 — Approach light flashing

| Elevation | 60° | 40° | 30° | 20° | 10° | 0° |
|---|---|---|---|---|---|---|
| | 55 cd/m² | 55 cd/m² | 45 cd/m² | 30 cd/m² | 15 cd/m² | 5 cd/m² |
| -180° Azimuth +180° (green light) | | | | | | |

Illustration 7 — Touchdown and lift-off area luminescent panels

| Elevation | 30° | 25° | 20° | 10° | 3° | 0° |
|---|---|---|---|---|---|---|
| | 10cd | 50cd | 100cd | | 100cd | 10cd |
| -180° Azimuth +180° | | | | | | |

Illustration 5 — Final approach and take-off area lights and aiming point lights

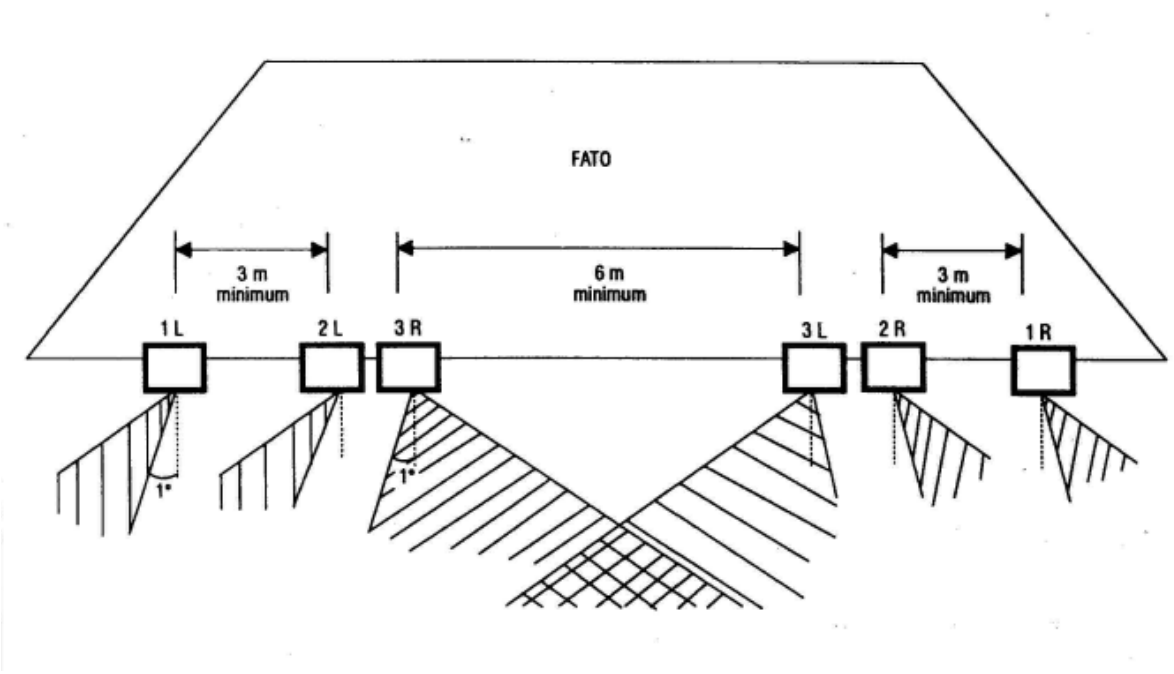
| Elevation (E) | 20°≤E≤ 90° | 13°≤E≤ 20° | 10°≤E≤ 13° | 5°≤ E≤ 10° | 2°≤E≤ 5° |
|---|---|---|---|---|---|
| | 3cd | 8 cd | 15 cd | 30 cd | 15cd |
| -180° Azimuth +180° (green light) | | | | | |

Note — Additional use may be made with this type of installation requiring identification by means of flashlights, of an elevation of less than two degrees.

Illustration 6 — Touchdown and lift-off area peripheral lights

APPENDIX M

# VISUAL ALIGNMENT GUIDANCE SYSTEM



APPENDIX N

# HELICOPTER APPROACH PATH INDICATOR

| Sector | Format |
|---|---|
| Above | Flashing green |
| On slope | Green |
| Slightly below | Red |
| Below | Flashing red |

Illustration A

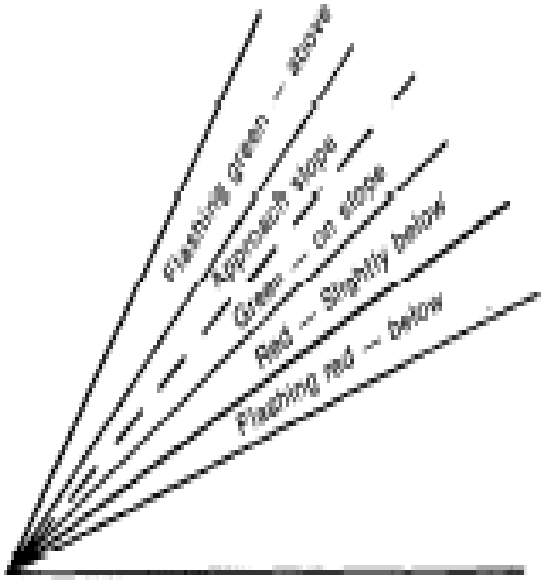



Illustration B